Cambridge Assessment International Education
Cambridge Ordinary Level

BIOLOGY **5090/21**

Paper 2 Theory **October/November 2019**

MARK SCHEME

Maximum Mark: 80

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Mark schemes will use these abbreviations:

; separates marking points
/ alternatives
() contents of brackets are not required but should be implied
R reject
A accept (for answers correctly cued by the question, or guidance for examiners)
Ig ignore (for incorrect but irrelevant responses)
AW alternative wording (where responses vary more than usual)
AVP alternative valid point (where a greater than usual variety of responses is expected)
ORA or reverse argument
underline actual word underlined must be used by candidate
+ statements on both sides of the **+** are needed for that mark

Question	Answer	Marks	Guidance
1(a)	water ; fibre / roughage ; starch ; other named ion ; other named vitamin ;	**2**	
1(b)	substitute (breast milk) ;	**1**	**A** formula
	lacking or low in vitamin D ; lacking or low in calcium ; reference to rickets ;	**2**	
1(c)	breast milk ;	**1**	
	highest fat / highest fat and sugar ; high sugar ; comparative data quote ; fat yields highest energy (per g) **AW** ;	**2**	
1(d)	antibodies ; (antibodies) made by mother / from mother ; colostrum ; passive immunity ;	**2**	

Question	Answer	Marks	Guidance
2(a)	**(A)** protein (coat) / capsid ; **(B**) RNA or DNA ;	**2**	
2(b)	any viral disease ; any bacterial disease ;	**2**	e.g. AIDS **A** HIV, 'flu' e.g. syphilis / cholera
2(c)(i)	cell / unicellular ; cytoplasm ; plasmid ; cell membrane ; cell wall ; ribosomes ; flagellum ; capsule ; reproduce without host / asexual reproduction / binary fission ; respiration ; method of nutrition ;	**2**	
2(c)(ii)	nucleus ; cellulose cell wall ; mitochondria ; large vacuole / cell sap ;	**1**	
2(d)	cytoplasm ; nucleus ; cell membrane ; ribosomes ; mitochondria ; vacuole ;	**3**	**R** cell sap or large vacuole

Question	Answer	Marks	Guidance
3(a)	transpiration / evaporation / diffusion ;	1	
3(b)	numbers / size / surface area + leaves ; numbers of stomata ; sizes of stomata / degree to which stomata are open ; rates of water uptake / number of root hairs ; sizes of plant ; thickness of cuticle ; hairs / sunken stomata ;	3	
3(c)(i)	**E** (drawing) gradient increases for minimum of 2 minutes ; **F** line with a reduced gradient / horizontal line to 24 minutes ;	2	
3(c)(ii)	**E** increase + water loss / transpiration / evaporation / diffusion ; water (vapour) removed / humidity decreases ; increased concentration gradient ; **F** decrease + water loss / transpiration / evaporation / diffusion ; photosynthesis decreases / stops ; guard cells lose their turgidity ; stomata close / stomata not open ; humidity increases ; decreased concentration gradient ;	5	

Question	Answer	Marks	Guidance
4(a)	Tt × Tt ; all four gametes correctly shown (T, t, T, t,) ; diagram labelled with parents / gametes / offspring ; four genotypes shown correctly (TT, Tt ,Tt, tt) ; identification of tt as child who doesn't find sprouts bitter ;	5	
4(b)	males are XY ; females are XX ; idea that males only one allele / B / b **AW** ; idea that females have two alleles/ B / b **AW** ; greater chance that males will not have the dominant allele (**B**) **ORA** ;	4	

Question	Answer	Marks	Guidance
5(a)(i)	rib / chest wall / thorax wall / rib cage / bone ;	1	
5(a)(ii)	*structure* external ; intercostal muscle ; *action* relaxes / lengthens ; ribs or rib cage / chest wall / thorax wall moves down / inwards ;	3	
5(b)	diaphragm ; relaxes ; domes **AW** upwards / not flattened ; **OR** internal ; intercostal ; contracts / shortens ; ribs or rib cage / chest wall / thorax wall moves down / inwards ;	3	

Question	Answer	Marks	Guidance
5(c)	pressure reduces ; lower than atmospheric pressure ; air in ; to lungs ;	**3**	

Question	Answer	Marks	Guidance
6(a)	stimulus ; receptors / named receptor ; in skin / eyes / retina ; impulses ; sensory / afferent neurone ; synapse ; relay / inter/ intermediate ; spinal cord / brain / CNS ;	**5**	
6(b)	biceps ; contracts ; triceps ; relaxes ; antagonistic ; pulls on ulna / ulna moves closer to humerus ; hinge joint **+** elbow ;	**5**	

Question	Answer	Marks	Guidance
7(a)	photosynthesis ; light energy ; starch / carbohydrate ; plant / producer eaten ; digested ; enzyme ; glucose ; respiration ; energy released ; for absorption **AW** ; movement against a concentration gradient ;	**7**	
7(b)	carbon dioxide ; greenhouse effect / global warming/climate change ; sulphur dioxide / NO_x ; acid rain ; conservation of resources / fossil fuels not renewable ;	**3**	

Question	Answer	Marks	Guidance
8(a)	digested / broken down /hydrolysis ; into amino acids ; by protease or named enzyme ; absorbed in small intestine, duodenum / ileum ; in villi / by capillaries / blood ; hepatic portal vein ; to liver ; deamination or described ; urea + in renal artery ; urea + taken to kidney ; blood filtered / urea leaves blood ; forms urine ; bladder / urethra ;	**8**	

Question	Answer	Marks	Guidance
8(b)	photosynthesis ; uses up CO_2 ; faster than is made during respiration ;	**2**	

Question	Answer	Marks	Guidance
9(a)	in solution / dissolved ; absorbed / taken up (by plant) ; by root hair ; active transport / diffusion ; correct description of concentration gradient ; (nitrate ion) carried in xylem ; to make amino acid ; (amino acid) carried in phloem ; to make proteins ; fruit / ovary ; cotyledon / endosperm ;	**8**	
9(b)	solvent ; activates enzymes ; for conversion of stored materials to provide energy for growth ; softening the seed coat (testa) ; for transport **AW** ;	**2**	